MaHRC On the MaHRC
The Newsletter of the Music and Health Research Collaboratory

Volume 3 No. 2,
March, 2014

Faculty of Music
University of Toronto

GENERAL NEWS

Upcoming events

Noon-hour Seminar: Sound Health: The Potential For Music Effects In Aging

Institute for Life Course and Aging is pleased to present a Noon-Hour Seminar with Lee Bartel, PhD, Professor, Associate Dean – Research, and Acting Director of MaHRC on

Thursday, March 13th, 2014, 12:00 pm – 1:30 pm
263 McCaul St., 4th Floor Classroom

Seminars are free. Please RSVP as seating is limited. This seminar will be webcast and can be accessed at:
http://hosting2.epresence.tv/AGING<http://utoronto.us2.list-manage1.com/track/click?u=55b74acdd734995b1aa4807a3&id=6424b15a6e&e=6114f1ee76>

Talk on Synesthesia by Dr. Julia Simner, PhD

Dr. Julia Simner is a neuropsychologist and leading expert in the field of synesthesia research. She trained at the Universities of Oxford, Toronto, and Sussex, and she currently runs the Synesthesia and Sensory Integration lab at the University of Edinburgh, Scotland. Her work focuses on the psychological and neuroscientific bases of synesthesia, and has been published in the high impact science journals such as 'Nature.' She is the editor of the Oxford Handbook of Synesthesia and is keenly interested in facilitating the public's understanding of science. Her work has been reported in over 100 media articles worldwide, including the NY Times, BBC, CBC, Telegraph, Times, New Scientist, Scientific American etc. In 2010 she was recognized as an outstanding European scientist by the European Commission's Atomium Culture Initiative and her science writing for the general public has been published in some of Europe's leading national newspapers.

Dr. Simner's presentation is supported by MaHRC, OCAD University, The Colour Research Society of Canada, and the Fraser Mustard Institute for Human Development.

March 18, 7:00 pm
Room 330, Faculty of Music
Topic: Tasty coloured sounds: The experiences of synaesthetes
Free: Everyone welcome.

Abstract: Synaesthesia is an inherited neurological condition that gives rise to a kind of 'merging of the senses.' For example, synaesthetes might 'see' colours when they hear music, or experience tastes in the mouth when they read words. One particularly common variant is experiencing colours when reading letters or numbers, and this variant of the condition – known as grapheme-colour synaesthesia -- is found in around 1 in 100 people. What are the experience of synaesthetes, and how do these unusual experiences develop during childhood? How do they impact on schooling and early life development and how do adult synaesthetes navigate their multisensory worlds? I will explore the nature of these cross-sensory experiences and ask what they might also tell us about sensory processing in the population at large. I'll describe what I have learned from the scientific research carried out at my Synaesthesia and Sensory Integration lab over the last decade, and how synaesthesia might open novel ways of understanding creativity, perception and the very nature of reality.

Music Therapy Training Course at MaHRC – May 2-3

On May 2 – 3, MaHRC is offering a Continuing Education Experience for Music Therapists with instructor Blythe LeGasse. Dr. Blythe LaGasse is Coordinator and Assistant Professor of Music Therapy at Colorado State University. Dr. LaGasse holds degrees from the University of Kansas (Ph.D. with Music Therapy and Communication Neuroscience emphasis), Colorado State University (M.M. in Music, Music Therapy), and University of Kansas (B.M. in Music Therapy). Additionally, and she holds Certification in Neurologic Music Therapy (NMT). With a strong background in communication neuroscience, her research interests include the use of music to improve communication and cognitive skills in children with developmental disabilities and autism spectrum disorders. At CSU, Dr. LaGasse teaches undergraduate and graduate coursework in Music Therapy, coordinates the Music Therapy Clinics, and Directs the Music Therapy Distance Learning Program.

Course Title: Neuroscience, Speech and Language Training in Music Therapy
Date: May 2, 5-9 pm & May 3, 10am-5 pm, 2014
Location: University of Toronto, Faculty of Music
Course Fee: $160 (Includes lunch and refreshment breaks)

Course Description: This course unfolds in two modules: Neuroscience of Music Therapy & Facilitating Speech and Language in Music Therapy

Neuroscience of Music Therapy:
Have you ever wanted to better understand articles about music in the brain or explain what is happening when your clients listen to music? This continuing education experience will help the music therapy clinician understand basic neuroscience. We will go over important brain areas, systems, and networks. We will then explore how music activates the brain. This information will be presented so that clinicians can better: (1) read research by knowing basic structures, and (2) explain how music can affect behavior. We will relate information to different client populations. You will learn through lecture, video supplements, and coloring! **In order to maximize time in person, participants will engage in 2 hours of self-led video instruction before May 2nd.**

Learning Objectives:

Participants will have the opportunity to:

- learn basic neurological systems
- understand how music therapy treatment can promote brain changes to improve nonmusical skills
- learn how current neuroscience research literature can inform treatment implementation
- understand basic science language that may be used in professional conversations

Facilitating Speech and Language in Music Therapy
Many music therapists work with individuals who have speech and language needs. This continuing education experience is designed to help the professional music therapist learn about the neurological and developmental aspects of speech and language as they relate to client populations. We will review current research and apply findings to client populations across the ages. We will practice using techniques that can facilitate functional speech and language goals. We will also learn about some assessment tools that can be used to measure progress. **In order to maximize time in person, participants will engage in 1 hour of self-led video instruction before May 2nd.**

Learning Objectives:
Participants will be able to:

- identify major factors in speech and language disabilities
- consider the role of neurological development in the production of speech
- identify the mechanisms that allow music to help in the development of speech and language
- identify relevant music therapy interventions for speech and language training

For more information contact:
Doreen at doreen.polestar@sympatico.ca

PLEASE NOTE: Although this course is financially subsidized by MaHRC, a minimum number of 15 registrants will be required to run the training. *If sufficient numbers are not registered by March 31st the training will be cancelled and fees refunded*

DISCLAIMER: These courses are not endorsed by the RF Unkefer Academy for Neurologic Music Therapy. Although the courses may introduce some Neurologic Music Therapy Concepts, completion of thee courses does not allow the participant to practice Neurologic Music Therapy nor does it take the place of the International Training Institutes in Neurologic Music Therapy which are conducted by the Robert F. Unkefer Academy for Neurologic Music Therapy and endorsed by the World Federation of Neurologic Rehabilitation (WFNR), by the European Federation of Neurorehabilitation Societies (EFNS), and the International Society for Clinical Neuromusicology (CNM).

Registration Now Open for IAMM 3rd International Conference 2014

The 3rd International conference of IAMM will be held at the University of Toronto June 24 - 27 2014.

The 3rd International Conference of the International Association for Music & Medicine is promising to be an outstanding event with an unprecedented line-up of Keynotes and Plenaries. On the theme of Music Medicine through the Lifespan, three keynote addresses, looking at childhood, adulthood, and the later years, will be presented by Dr. Laurel Trainor, Director of the McMaster Institute for Music and Mind, Dr Julian Thayer, Ohio Eminent Scholar Professor in Health Psychology, Ohio State University, and Dr. Alicia Ann Clair, Professor and Director of Music Education and Music Therapy at the University of Kansas. Dr. Clair is also a Research Associate in Gerontology at KU. In addition there will be three neuroscience plenaries featuring MaHRC associates and three hospital research associates featuring music research being conducted at Toronto hospitals. A special feature is the talk at the conference dinner by internationally celebrated neuroscience writer and MaHRC associate, Dr. Norman Doidge.

For general conference information, please see

http://www.iammcanada.com

RSS Research Key to MaHRC Agenda

One of the areas of strong potential in music medicine is the role of low frequency sound stimulation on rhythmic neural coherence in the brain that is believed to be related to cognition and dysregulation to a number of medical conditions. If coherent brain activity can be stimulated with rhythmic sensory stimulation (RSS) either through the ears or through feeling the vibration, then specifically created music or sound can potentially contribute to Neurorehabilitation. Consequently, MaHRC Associates are currently pursuing a number of studies described below.

Rhythmic Sensory Stimulation as a Model of Plasticity and Rehabilitation in Healthy Children and Children with Cognitive Impairments
Research Team: Colleen Dockstader, Ph.D., Lee Bartel, Ph.D., Donald J. Mabbott, Ph.D.

Status: Approved, funded, waiting REB approval.

Inducing Gamma Rhythms in Children Who Show Gamma Rhythm Deficits.
Cognitive impairment is consistently reported in children treated with cranial radiation (CRT) for a brain tumor and the chronic neurocognitive sequelae typically worsen over time. Using Magnetoencephalography (MEG), we recently showed that gamma rhythms are both globally and regionally disrupted in children who show cognitive processing deficits after treatment for a brain tumor. There is a particularly high correlation between a dearth of sensorimotor gamma rhythms (from 60-100Hz) and slowed information processing speed in this population. Using a vibrotactile stimulator to artificially drive fast rhythms in the sensorimotor cortex we will attempt to induce central gamma rhythms in children treated with CRT. We will first examine whether the fastest rhythms can be mechanistically reproduced in the injured brain. If not, this suggests that children treated with CRT are physically limited in the speed of neural firing due to injury. If these rhythms can be induced it suggests that artificial induction of gamma rhythms may be included in rehabilitation strategies in which information processing speeds are delayed.

Improvement of tactile acuity and neuroplastic modulation of gamma oscillations after short-term rapid sensory stimulation

Research Team: Shahab Jamali, Lee Bartel, Claude Alain, Gottfried Schlaug, Bernhard Ross.

Status: Waiting for REB approval

Description: The aim of this study is expanding our previous work about beta and gamma oscillations elicited by vibrotactile stimulation and link those to the behavioural findings by Dinse and colleagues. In a series of studies, Dinse and colleagues showed an improvement of tactile acuity after passive sensory stimulation (Godde, Stauffenberg, Spengler, & Dinse, 2000; Kalisch, Tegenthoff, & Dinse, 2008; Kattenstroth, Kalisch, Peters, Tegenthoff, & Dinse, 2012; Schlieper & Dinse, 2012). We aim to reproduce improvements of tactile acuity after short-term rhythmic stimulation, to record accompanying oscillatory brain activity, and to observe neuroplastic modulation of brain oscillations in different frequency bands in order to elucidate the neural mechanisms underlying beneficial effects of passive stimulus experience. Moreover we aim to address if the observed changes are specific for a periodic stimulus.

SIGNIFICANCE
This study will investigate the effect sensory processing beyond primary representation of the sensory input in tactile perceptual learning and training. Specifically, effects of gamma network will be investigated for tactile perceptual learning for the first time to our knowledge. Furthermore, such we will be investigate if the effects are specific for

periodic stimulation to study effects of rhythmic stimulation versus exposure to the stimulus.

Sustained changes in somatosensory gamma responses after brief vibrotactile stimulation

Status: Accepted for publishing in NeuroReport: Jamali, Shahab, and Bernhard Ross. "Sustained changes in somatosensory gamma responses after brief vibrotactile stimulation." *Neuroreport* (2014).

Description: Short-time passive tactile stimulation at 20 Hz improves tactile discrimination acuity. We investigated whether sustained 20-Hz stimulation also modifies cortical responses and whether those changes are plastic as indicated by differences between subsequent recording sessions. 20-Hz touch stimuli were applied to the fingertip, and beta and gamma oscillations at multiples of the stimulus frequency were recorded with magnetoencephalography. Neuromagnetic sources were found in the contralateral somatosensory cortex. Beta responses decreased within a session however recovered after a break between two sessions. In contrast, gamma responses were consistent across repeated blocks and increased between the sessions. The differences between beta and gamma activities suggest that stimulus experience enhanced the temporal precision of the cortical stimulus representation while the magnitude of the primary somatosensory response stayed constant.

SIGNIFICANCE
The finding that response adaptation occurred in the 20-Hz β response only, while γ (40 and 60 Hz) responses showed neuroplastic increases between subsequent sessions suggests that stimulus experience enhances the temporal precision of cortical representation rather than the magnitude of the primary somatosensory response. Therefore, this study hinted to possible different functional role of induced beta and gamma oscillations.

Interference in dichotic listening: the effect of contralateral noise on oscillatory brain networks

Status: Published in European Journal of Neuroscience: Ross, B., Miyazaki, T., & Fujioka, T. (2012). Interference in dichotic listening: the effect of contralateral noise on oscillatory brain networks. *European Journal of Neuroscience*, *35*(1), 106-118.

Extension: Using same paradigm to study thalamocortical networks in auditory processing Alzheimer's as part of the Connaught research agenda.

Present Team: Shahab Jamali, Claude Alain, Lee Bartel, Gottfried Schlaug, and Bernhard Ross.

Description: Coupling of thalamocortical networks through synchronous oscillations at gamma frequencies (30–80 Hz) has been suggested as a mechanism for binding of auditory sensory information into an object representation, which then becomes accessible for perception and cognition. This study investigated whether contralateral noise interferes with this step of central auditory processing. Neuromagnetic 40-Hz oscillations were examined in young healthy participants while they listened to amplitude-modulated sound in one ear and a multi-talker masking noise in the contralateral ear. Participants were engaged in a gap-detection task, for which their behavioural performance declined under masking. The amplitude modulation of the stimulus elicited steady 40-Hz oscillations with sources in bilateral auditory cortices. Analysis of the temporal dynamics of phase synchrony between source activity and the stimulus revealed two oscillatory components; the first was indicated by an instant onset in phase synchrony with the stimulus while the second showed a 200-ms time constant of gradual increase in phase synchrony after phase resetting by the gap. Masking abolished only the second component. This coincided with masking-related decrease of the P2 wave of the transient auditory-evoked responses whereas the N1 wave, reflecting early sensory processing, was unaffected. Given that the P2 response has been associated with object representation, we propose that the first 40-Hz component is related to representation of low-level sensory input whereas the second is related to internal auditory processing in thalamocortical networks.

Short-Term Effects of Rhythmic Sound Stimulation on Alzheimer Patients: An Exploratory Pilot Study

Research Team: Amy Clements-Cortes, Heidi Ahonen, Angela Colantonio, Colleen Ray, Bernhard Ross, Claude Alain, Morris Freedman, Lee Bartel.

Status: Waiting approval of REB amendment.

Description: This study is exploratory based on three assumptions: (1) that a fundamental frequency of 40Hz brainwave activity is involved in intra-brain communication and that it is a covariate of cognition; (2) that Alzheimer's patients have lower levels of 40Hz brain activity; and (3) that rhythmic sensory stimulation can drive an increase in 40Hz brain activity. This pilot study will explore the behavioural effect of stimulating Alzheimer's patients at three stages of AD with sound-activated vibro-tactile stimulation of the somatosensory system at a rate of 40Hz. Subjects will receive stimulation twice a week for 8 weeks and response will be assessed with the Mini-Cog test, the Observed Emotion Rating Scale, and behavioural observation by the researcher. Outcomes are expected to include improved memory and cognitive clarity.

On the MaHRC Newsletter is created and edited by: Prof. Lee Bartel, Associate Dean-Research and Acting Director of MaHRC. For questions or comments: music.research@utoronto.ca

Adjunct and Status-Only Appointed Members of MaHRC, Faculty of Music:

Heidi Ahonen, PhD, MTA. Professor of Music Therapy at Wilfrid Laurier University.

Claude Alain, PhD. Assistant Director and Senior Scientist of the Rotman Research Institute at the Baycrest Centre

Quincy Almeida, PhD. Director, Sun Life Movement Disorders Research & Rehab Centre, Wilfrid Laurier University.

Dr. David Alter, MD, PhD, FRCPC. Cardiologist, Senior Scientist in the Institute for Clinical Evaluative Sciences.

Dr. Jennifer Anderson, MD, FRCSC. St Michael's Hospital, Otolaryngologist in Chief, Department of Otolaryngology - Head and Neck Surgery

Gavin Andrews, PhD. Professor, Department of Health, Aging, & Society, McMaster University.

Dr. John Axler, MD, CCFP. Director of Continuing Education Projects for the Department of Family and Community Medicine, University of Toronto.

Katherine M. Boydell, PhD. Senior Scientist and Scientific Dir of Qualitative Inquiry, Child Health Evaluative Sciences, The Hospital for Sick Children.

Dr. Davor Cepo, DC. Wasser Pain Management Centre, Mount Sinai Hospital

Tom Chau, PhD. Vice Pres, Research - Holland Bloorview Kids Rehab; Director - Bloorview Research Inst; Canada Res Chair in Paediatric Rehab Eng

Dr. Joseph Chen, MD, FRCSC. Otolaryngologist-in-Chief at Sunnybrook Health Sciences Centre; Associate Professor, University of Toronto.

Joyce Chen, PhD. Stroke Rehabilitation Scientist, Heart and Stroke Foundation Centre for Stroke Recovery, Sunnybrook Hospital

Dr. John Chong, MD, CGPP, ABIME, FACPM, FRCPC, DOHS, ARCT. Medical Director of Musicians' Clinics of Canada.

Amy Clements-Cortes, PhD. MTA, MT-BC, FAMI. Senior Music Therapist, Baycrest Centre; Assistant Professor (Research) Faculty of Music, U of T

Angela Colantonio PhD. Prof, Dept of Occup Sci & Occup Therapy, Dalla Lana Sch of Pub Health; Grad Dept of Rehab Sc, Fac of Med, U of T

Karen Davis, PhD. Prof. Surgery; Head, Div of Brain, Imaging and Behaviour - Systems Neuroscience, Tor Western Res Inst, UHN

Maureen Dennis, PhD. Senior Scientist, Psychology, The Hospital for Sick Children; Professor, Institute Medical Sciences

Dr. Norman Doidge, MD, FRCP(C). MACPsa. Assistant Professor of Psychiatry, Faculty of Medicine, UT, CAMH Clarke Institute Division.

Colleen Dockstader, PhD. Research Associate, Mabbott Laboratory, Sick Kids Hospital.

Michael J Evans, PhD. Professor of theoretical statistics and biostatistics, U of T, cross-appointment to the Dalla Lana School of Public Health.

Joaquin Farias PhD. Prof of Ergonomics at the Conservatorio Superior de Música de Sevilla; Researcher, School of Medicine at the Univ of Valencia.

Dr. Morris Freedman MD FRCP(C). Exec Medical Dir Centre for Memory and Neurotherapeutics; Medical Dir of the Ross Memory Clinic at Baycrest

Shari Geller, PhD. Clinical Psychologist; Faculty in Health Psychology, York University;

Dr. Allan Gordon, MD, FRCP(C) Clinical Neurologist and Director of the Wasser Pain Management Centre, Mount Sinai Hospital.

Jessica Grahn, PhD Assistant Professor at the Centre for Brain and Mind in the Department of Psychology, University of Western Ontario.

Robert Harrison, PhD. Senior Scientist in Otolaryngology, Neurosciences & Mental Health, and Auditory Science at Sick Children's Hospital;

Sylvain Houle, PhD. Director of the Research Imaging Centre at the Centre for Addiction and Mental Health (CAMH) and the University of Toronto.

Gabriela Ilie, PhD. Lecturer, Department of Psychology, UTS; Post-Doc St. Michael Hospital, Neurosurgery, Injury Prevention Office and CAMH

Pia Kontos, PhD. Scientist, Toronto Rehabilitation Institute; Assistant Professor in the Dalla Lana School of Public Health.

Nancy J. Lobaugh, PhD. CAMH Indep Scientist, Research Imaging Centre MRI Suite and Assist Prof of Neurology at the U of T Faculty of Medicine.

Aaron J. Low, MSc. Speech-Language Pathologist, The Voice Clinic, Toronto.

Renee Lyons, PhD, Scientific Dir, Bridgepoint Collaboratory for Research and Innovation; Professor in the Dalla Lana School of Public Health at Uof T.

Lynn McDonald, PhD. Prof, Faculty of Social Work; Dir, Inst for the Life Course and Aging; Scientific Dir, National Initiative for Care of the Elderly

Patricia McKeever, PhD. Sen Scientist, Bloorview Kids Fndn Chair in Childhood Disability Studies, Bloorview Research Institute; Prof, Fac of Nursing

Dr. Henry Moller, MD, DABSM, FRCPC. Assistant Professor, Department of Psychiatry, University of Toronto; Toronto Sleep Clinics.

Sylvain Moreno, PhD Scientist, Rotman Res Inst, Baycrest; Assist Prof, Dept of Psychology; Dir, NeuroEducation Across the Lifespan Lab, Rotman.

Dr. Lili Naghdi, MD, CCFP. The Health Centre of Maple, Sound Therapy Centre of Vaughan.

Kristine Newman, RN, CRN(C), PhD. Daphne Cockwell School of Nursing, Ryerson University.

Dr. Allan Peterkin, MD FRCP(C) FCFP Assoc Prof, Psychiatry and Fam Medicine, U of T; Coord, Narrative Medicine & Humanities Prog, Mt Sinai Hosp;

Dr. Larry M. Picard, MD. FRCP(C). Clinical Neurologist, Wasser Pain Management Centre, Mount Sinai Hospital.

Rebecca Renwick, PhD. Professor, Department of Occupational Science and Occupational Therapy; Director of the Quality of Life Research Unit

Larry E. Roberts, PhD. Professor in the Department of Psychology, Neuroscience, and Behaviour at McMaster University.

Mark Rosenberg, PhD. Prof of Geography, Prof of Community Health and Epidemiology, Canada Res Chair in Development Studies, Queen's Univ

Bernard Ross, PhD. Senior Scientist at Rotman Research Institute, Baycrest Centre and Associate Professor in the Department of Medical Biophysics.

Frank Russo, PhD. Associate Professor, Department of Psychology, Ryerson University; Director, Science of Music, Auditory Research and Tech Lab.

Glenn Schellenberg, PhD. Professor, Department of Psychology, University of Toronto. Director, Music & Cognition Laboratory, UTM

Mark Schmuckler, PhD. Prof, Dept of Psychology, University of Toronto; Director, Laboratory for Infant Studies; Director, Music Cognition Lab, UTS.

Michael Schutz, PhD Assist Prof of Music, McMaster Univ; Dir, MAPLE (Music, Acoustics, Perception, and LEarning) Lab. Core member, MIMM;

Sandra Trehub, PhD. Professor Emeritus, Department of Psychology, University of Toronto; Director, Auditory Development Laboratory, UTM

Lidan You, PhD. Assistant Professor, Department of Mechanical and Industrial Engineering, University of Toronto.